Cryotherapy

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Introduction:-

The application of cold for various therapeutic purposes is called cryotherapy.

Cryotherapy is commonly used in the treatment of acute trauma and subacute injury.

The temperature of the body tissue is reduced and the heat is transferred from the body tissue to the cold medium.

The magnitude of cooling depends upon the area of the body tissue exposed, temperature of the cooling agent and the duration of exposure.

The depth of penetration is also related to intensity and duration of cold application and the circulatory response to the body segment exposed.

The various techniques that are used for administering cold are:

i. Ice massage

ii. Ice towels

iii. Immersion in cold or cold whirlpool

iv. Ice packs or cold packs

v. Evaporative cooling or vapocoolant sprays

vi. Excitatory cold.

1. Ice Massage:-

In this technique ice is placed in a polythene bag and applied over the body tissue. Ice cubes, crushed ice or flaked ice, etc. can be used. The ice bag is placed over the patient's tissue and the patient is not allowed to lie over the pack. The pressure of application should be minimal and the movement of the bag should be to and fro and circular. The ice can be placed over the body tissue for a period of 10–20 minutes

2. Ice towels:- This is a popular method of application because there is little danger of producing an ice burn. Prepare the ice solution by filling a bucket or bowl with two parts of flaked or crushed ice to one part water in which two terry towels are immersed. It is then applied to the part being treated. The towels are changed after every 30 seconds to 2 minutes. Upto ten towels can be applied consecutively with total treatment time of

15–20 minutes.

3. Immersion in cold or cold whirlpool:-

The part of the body is immersed in cold water or a whirlpool in which temperature of water is lowered up to 0–10ºC. Flaked ice or crushed ice is used in a

solution with water to form slush. Extremities of the body can be effectively treated with immersion in the cold. The total duration of the treatment is around 10 minutes in which the patient can immerse in either for a single 10 minutes session or for a series of shorter immersions until accumulative total of 10 minutes have been reached.

4. Cold packs:-

Commercially used cold packs are used for administering cold. These cold packs contain special material which retains the cold like the silicate gel.

These are available in various sizes and shapes. Different body parts are treated with different sizes and shapes of cold packs . These packs are stored in a special refrigeration or freezer for at least 20 minutes to 1 hour before use . The main advantage of these cold packs are that they are reusable and can contour or mould themselves according to the body part treated.

5. Evaporative cooling or vapocoolant sprays:-

The use of vapocoolant sprays are increasing nowadays. These are being used very commonly in sporting activities or athletic injuries.

The commonly used sprays are fluoromethane or ethyl chloride. The jet of spray is usually applied from a distance of about 1 feet or 12 inches. Gentle stretch is applied to the tissues after application of vapocoolant sprays.

6. Excitatory cold:-

The marked sensory stimulus of ice on the skin can be used to facilitate contraction of inhibited muscle. Ascertain the spinal root level supply (myotome) of inhibited muscle and find the area of skin which has same root supply (dermatome).

The ice is stroked quickly three times over the dermatome and skin is then dried. This sensory stimulus passes via the peripheral nerve and enters the cord through posterior horn. It raises the level of excitation around the anterior horn . The increased excitation may supplement the patient’s willing effort to make the muscle contract. This technique of ‘quick ice’ is often a useful stimulus in aiding voluntary contraction of muscle.

Basic principles

When cold therapy is applied to the tissues, the heat is absorbed from the tissues by the cooling agent. Ice changes its state from solid to liquid by absorbing heat. A specific amount of energy is required to change the solid form of ice into water which is called latent heat of fusion. One gram of ice at 0ºC requires 336 Joules of energy to convert it into 1 gram of water at 0ºC, whereas 1 gram of water at 0ºC requires 155 joules of energy to convert it into 1 gram of water at 37ºC. Thus, for cooling the body tissues it is better to use ice for treatment rather than water.

Physiological effects and Indications of cold therapy

Effects on Circulatory System and Uses

The initial response of the body tissue to cold is that to preserve the heat. This is accomplished by an initial phase of local vasoconstriction. When homeostasis is reached and the body part has become cooled, there follows phase of vasodilatation. Then there follows alternate periods of vasoconstriction and vasodilatation. This appears as hunting toward the mean point and is known as Lewis-Hunting reaction. The initial phase of vasoconstriction helps to reduce the flow of blood into the tissues following recent

injury. This helps to limit swelling and the extent of tissue damage. The alternate phases of vasoconstriction and vasodilatation helps removing the waste products of metabolism like the lactic acid and thus delays fatigue.

Effects on Nervous System and Neural Tissues

The rate of conduction of the nerve fibers is reduced by cold. The A fibers are affected first followed by B and C fibers.

The major effects of ice application are to relieve pain.

Dangers and Contraindications

1. **Cardiac conditions**:

The administration of cold therapy in cardiac patients needs special attention. In patient with a recent myocardial infarction, the application of cold may cause further drop in blood pressure and further reduces the blood supply of the heart. The weak heart may collapse immediately.

2. **Peripheral nerve injuries**:

In cases with peripheral nerve injuries, the blood supply of the peripheral nerves reduces further and may cause its further damage. Also, the nerve supply

of the blood vessels is further delayed causing loss of the normal response of its cooling. Thus, in the patients with peripheral nerve injuries the application of cold should be avoided.

3. **Peripheral vascular disease or vasospastic disease**: The application of cold should be avoided in cases of peripheral vascular disease, as the cold may further reduce an already inadequate blood supply. In cases of vasospastic disease like the Raynaud’s disease, the condition may worsen by the application of cold.

4. **Psychological or cold sensitive**:

The patients having fear of the cold may react adversely. Following the application of cold, they start producing histamine like substance causing urticaria with skin rash and itching. The application of cold in psychologically apprehensive persons and the cold sensitive patients is avoided.

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